

HCP→FCC Transitions in Fe and Co at High Pressures and Temperatures*

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We have studied the hcp→fcc phase transitions of iron and cobalt at high pressures and temperatures by using *in-situ* synchrotron x-ray diffraction coupled with a diamond-anvil cell laser-heating technology. In this study, we have found that the hcp→fcc transition occurs at higher temperatures in cobalt than in iron. The high temperature fcc phase of iron disappears at the fcc/hcp/liquid triple point at about 50 GPa and 2500 K; whereas, that of cobalt is stable at substantially higher pressures to about 100 GPa. At low pressures below 40 to 50 GPa, we have also found a set of new diffraction lines arising during the hcp→fcc transitions in both Fe and Co, of which patterns can be indexed to a dhcp structure. In this paper, we will present the x-ray data of iron and cobalt and, then, discuss about the systematics of the hcp→fcc transitions in Group VIII elements and the metastability of the dhcp phase.

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